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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/696,955	10/27/2000	Kazuyoshi Tamura	107703	3185

7590

01/30/2002

Oliff & Berridge PLC
P O Box 19928
Alexandria, VA 22320

EXAMINER

ANDERSON, MATTHEW A

ART UNIT PAPER NUMBER

1765

DATE MAILED: 01/30/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/696,955

Applicant(s)

TAMURA ET AL.

Examiner

Matthew A. Anderson

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 October 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ke et al. (US 6,284,093 B1) in view of Wolf et al. (Vol. 1 pp. 8, 23-27, 32-33, 59, 1986) and Tamatsuka et al. (US 6,299,982 B1).

Ke et al. discloses a non-dielectric ring which surrounds a workpiece wafer in a plasma semiconductor processing chamber. The ring is disclosed as consisting of Si of the single crystal variety in col. 6 lines 31-38. In col. 14 lines 66+ and col. 15 lines 1-10 the cylindrically symmetrical nature of the ring with respect to the wafer axis is disclosed.

Ke et al. does not disclose the oxygen or nitrogen concentration in the ring or the method of forming the ring.

Wolf et al. discloses known Si processing methods. Cz silicon was shown on page 8 to be well known. On page 23 -25 disclose methods of forming wafers. Etching of the surface to remove contamination and damage from metal working is also disclosed. On page 32 is disclosed the incorporation of oxygen and nitrogen into Cz silicon to increase the warpage resistance of the Si. This warpage resistance would be of great value in a batch processing chamber such as that described by Ke et al.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine Ke et al. and Wolf et al. because Ke et al. discloses Si mono-crystalline focus rings and Wolf et al. discloses known ways of working with and improving the warpage resistance of items formed from such Si.

The combination does not specify a ring with certain atomic concentrations of oxygen or nitrogen.

Tamatsuka et al. discloses Si wafers made from a Cz Si ingot which has nitrogen concentration of 1×10^{10} atoms/cm³ to 5×10^{15} atoms/cm³ and a oxygen concentration of 1×10^{18} atoms/cm³.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the Si of Tamatsuka with the previous combination because Wolf et al. discloses the superior warpage resistance of Si doped with oxygen and nitrogen and use of such a known material in a known capacity would have been anticipated to produce an expected result.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to use a monocrystalline Si focus ring with a nitrogen concentration of 5×10^{13} atoms/cm³ to 5×10^{15} atoms/cm³ and a oxygen concentration of 5×10^{17} atoms /cm³ to 1.5×10^{18} atoms/cm³ because Si rings were known, such doping concentration of N and O was known for Si, and it was known that N and O increased the warpage resistance of Si.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to etch the surface of the focus ring because etching the surface of Si

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to remove processing damage and contamination was known to Wolf et al. and would have been anticipated to produce an expected result.


As far as the process for the production of the focus ring, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form a ring from Cz monocrystalline Si because Ke et al. discloses such a shape, Wolf et al. discloses metalworking of Si, Tamatsuka et al. discloses Si with such doping concentrations and one of ordinary skill in the art would have been able to bore a hole thus producing a ring as in Ke et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone number is (703) 308-0086. The examiner can normally be reached on M-Th, 6:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

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